OCTOPICOLA REGALIS, N. SP. (COPEPODA, CYCLOPOIDA, LICHOMOLGIDAE) ASSOCIATED WITH *OCTOPUS CYANEUS* FROM NEW CALEDONIA AND ENIWETOK ATOLL

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ABSTRACT

A cyclopoid copepod, *Octopicola regalis,* n. sp., is described from *Octopus cyaneus* in New Caledonia and at Eniwetok Atoll. This is the first record of the genus from the Pacific Ocean.

Copepods belonging to the genus *Octopicola* Humes, 1957 (see also Delamare Deboutteville, Humes & Paris, 1957) have been reported from the Channel and Mediterranean coasts of France, the West Indies, and Madagascar. The new species described here is the first record of *Octopicola* from the Pacific Ocean.

The copepods were recovered from the sediment obtained after washing the octopuses, particularly their mantle cavities, in sea water containing about 5 per cent ethyl alcohol. The specimens from Eniwetok Atoll in the Marshall Islands were collected in 1969 by the author and Mr. Charles T. Krebs of Boston University during field work made possible by the support and facilities of the Eniwetok Marine Biological Laboratory at Eniwetok. The material from New Caledonia was collected in 1971 by the author and Mr. Roger C. Halverson from the University of California at Santa Barbara. The field work in New Caledonia and the subsequent study of the specimens were supported by a grant (GB-8381X) from the National Science Foundation.

I am grateful to Dr. Gilbert L. Voss, University of Miami, for the identification of the octopuses from Eniwetok, and to Dr. Paul Rancurel, Centre de Nouméa, Office de la Recherche Scientifique et Technique Outre-Mer, for the determination of those from New Caledonia.

All the figures have been drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn. The abbreviations used are: A_1 = first antenna; A_2 = second antenna; MXPD = maxilliped; and P_1 = leg 1. The following description and figures are based on specimens from Ricaudy Reef, near Noumea, New Caledonia.

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Octopicola regalis, n. sp.

Figs. 1-30

Type-Material.—2 ♀♀, 2 ♂♂ from one *Octopus cyaneus* Gray, in 0.5 m, west of Isle Ngou, near Noumea, New Caledonia, 22°13′44″S, 166°23′01″E, 3 August 1971. Holotype ♀, allotype, and 2 paratypes (1 ♀, 1 ♂) deposited in the National Museum of Natural History (USNM), Washington, D.C. (numbers: holotype 142986, allotype 142987, paratypes 142988).

Other Specimens (all from Octopus cyaneus).—NEW CALEDONIA: 1 ♂ from 1 host, in 0.5 m, Rocher à la Voile, Noumea, 22°18′24″S, 166°25′50″E, 17 June 1971; 2 ♀♀, 2 ♂♂ from 1 host, in 3 m, Ricaudy Reef, near Noumea, 22°19′00″S, 166°26′44″E, 20 July 1971; 1 ♂ from 1 host, in intertidal pool among corals, beach at Poe, near Bourail, 21°44′00″S, 165°27′00″E, 4 August 1971.

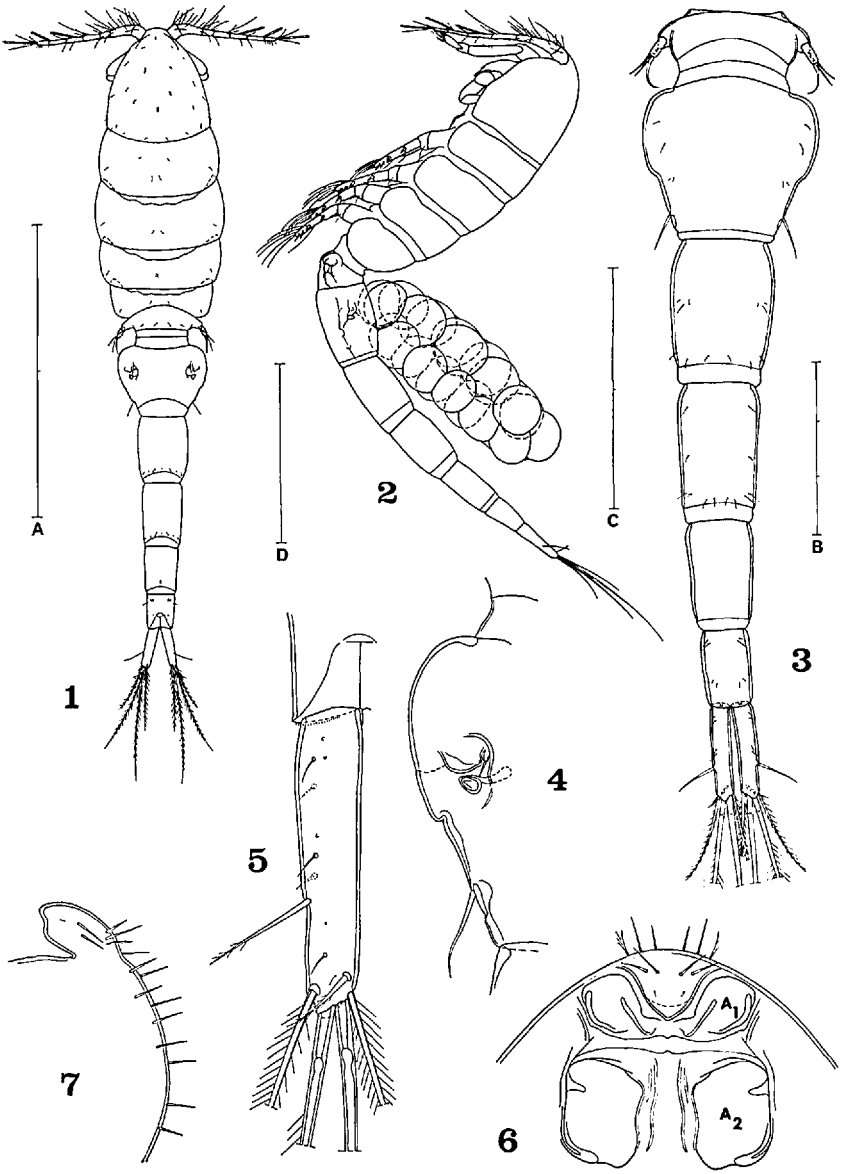
ENIWETOK ATOLL: 2 ♀♀, 2 ♂♂ from 1 host, in 3 m, western side of Eniwetok Island, 27 June 1969; 1 ♂ from 1 host in the same locality, 20 July 1969.

Female.—The body (Figs. 1, 2) is elongated and slender. The length (not including the setae on the caudal rami) is 2.24 mm (2.11-2.39 mm) and the greatest width 0.41 mm (0.39-0.43 mm), based on four specimens in lactic acid. The segment of leg 1 is clearly delimited from the cephalosome. The epimeral areas of the metasomal segments are rounded. The ratio of the length to the width of the prosome is 2.17 : 1. The ratio of the length of the prosome to that of the urosome is 1 : 1.27, the urosome being longer than the prosome.

The segment of leg 5 (Fig. 3) is 130μ × 250μ. The genital segment is 246μ × 292μ, the broad anterior half set off from the tapered posterior part by lateral indentations. The genital areas (Fig. 4) are located dorsolaterally just anterior to the middle of the segment. The four postgenital segments are 237μ × 169μ, 234μ × 132μ, 177μ × 101μ, and 127μ × 81μ from anterior to posterior. The anal segment has posteroventrally on each side a row of minute marginal spinules.

The caudal ramus (Fig. 5) is 160μ × 34μ (the width taken at the middle), about 4.7 times longer than wide. The outer lateral seta is 75μ and slightly haired. The dorsal seta is 36μ and similarly haired. The outermost terminal seta is 156μ and the innermost terminal seta is 240μ, both with lateral spinules. The two long median terminal setae are 352μ and 473μ, both inserted dorsally to a ventral flange with small submarginal spinules, and both with lateral spinules.

The body surface carries many small hairs (sensilla) as shown in Figures 1 and 3.



FIGURES 1-7. *Octopicola regalis*, n. sp., female: 1, dorsal (scale A); 2, lateral (A); 3, urosome, ventral (B); 4, genital area, dorsal (C); 5, caudal ramus, dorsal (D); 6, rostrum, ventral (C); 7, rostrum, lateral (C). (Scale A = 1.0 mm; B = 0.3 mm; C = 0.2 mm; D = 0.1 mm.)

The egg sac (Fig. 2) is elongated, 858μ × 286μ, reaches to the beginning of the anal segment, and contains 18-20 eggs of variable form with diameters ranging from 140μ-150μ.

The rostrum (Figs. 6, 7) is broadly acute in ventral view and snoutlike in lateral view. It bears ventrally two minute setules and four long setules; anteroventrally it has four long setules and two branched setules.

The first antenna (Fig. 8) is 432μ long. The lengths of the seven segments (measured along their posterior nonsetiferous margins) are 43μ (66μ along the anterior margin), 70μ, 35μ, 82μ, 69μ, 66μ, and 44μ, respectively. The formula for the armature is 4, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All the setae are naked. The third segment shows ventrally an intercalary piece (Fig. 9).

The second antenna (Fig. 10) is 312μ long. The first segment has one minutely barbed inner distal seta. The long second segment has a similarly barbed seta located about midway on the inner edge, and the posterior and inner surfaces of the segment are covered with short spinules. The third segment bears three elements: a clawlike jointed spine, a blunt spine with rows of long hairs along its inner edge, and a small naked seta. The fourth segment (Fig. 11), 65μ × 24μ in greatest dimensions, bears four short smooth claws and three setae, two of which are barbed.

The labrum (Fig. 12) has two elongated posteroventral lobes. The mandible (Fig. 13) resembles that of *O. stocki* Humes, 1963, and *O. superbus* Humes, 1957. There are fine surficial striations on the base of the tooth. The paragnath (Fig. 14) is a small unornamented lobe. The first maxilla (Fig. 15) has three setae. The second maxilla (Fig. 16) is 2-segmented. The first segment is unornamented. The second segment bears a smooth seta and a spinelike seta with spinules along one side, the segment terminating in a lash with graduated teeth, the first being the largest and toothlike. The maxilliped (Fig. 17) is 3-segmented. The first segment is unornamented. The second segment bears two small naked setae and a distal patch of small spinules. The small third segment has two spines and a small seta, all naked.

The ventral area between the maxillipeds and the first pair of legs (Fig. 18) is only slightly protuberant (Fig. 2).

Legs 1-4 (Figs. 19, 20, 21, 22) have 3-segmented rami except for the endopod of leg 4, which consists of a single segment. The armature of the legs is as follows (the Roman numerals indicating spines, the Arabic numerals setae):

P_1	coxa	0-0	basis	1-0	exp	I-0;	I-1;	II,I,5
					enp	0-1;	0-1;	I,5
P_2	coxa	0-0	basis	1-0	exp	I-0;	I-1;	II,I,6
					enp	0-1;	0-2;	I,I,4

P_3	coxa	0-0	basis	1-0	exp	I-0;	I-1;	II,I,6
					enp	0-1;	0-2;	I,I,3
P_4	coxa	0-0	basis	1-0	exp	I-0;	I-1;	I,I,6
					enp	3		

The exopod of leg 4 is 195μ long. The endopod is 125μ × 44μ and the three setae from outer to inner are 110μ, 195μ, and 240μ.

Leg 5 (Fig. 23) has a distinct, unornamented free segment 37μ × 18μ, bearing two unequal naked setae, the larger one with a swollen base. The body segment overlaps dorsally part of the free segment and it is upon this flange that the naked dorsal seta arises.

Leg 6 (Fig. 4) consists of a small naked seta (10μ) on the genital area and a large naked seta (64μ) posterolateral to this area.

Living specimens in transmitted light were opaque, the eye red, the egg sacs opaque gray.

Male.—The body (Fig. 24) resembles in general form that of the female. The length (without the ramal setae) is 1.62 mm (1.50-1.73 mm), and the greatest width 0.32 mm (0.31-0.34 mm), based on five specimens in lactic acid. The ratio of the length to the width of the prosome is 2.37 : 1. The ratio of the length of the prosome to that of the urosome is 1 : 1.17, the urosome being longer than the prosome, as in the female.

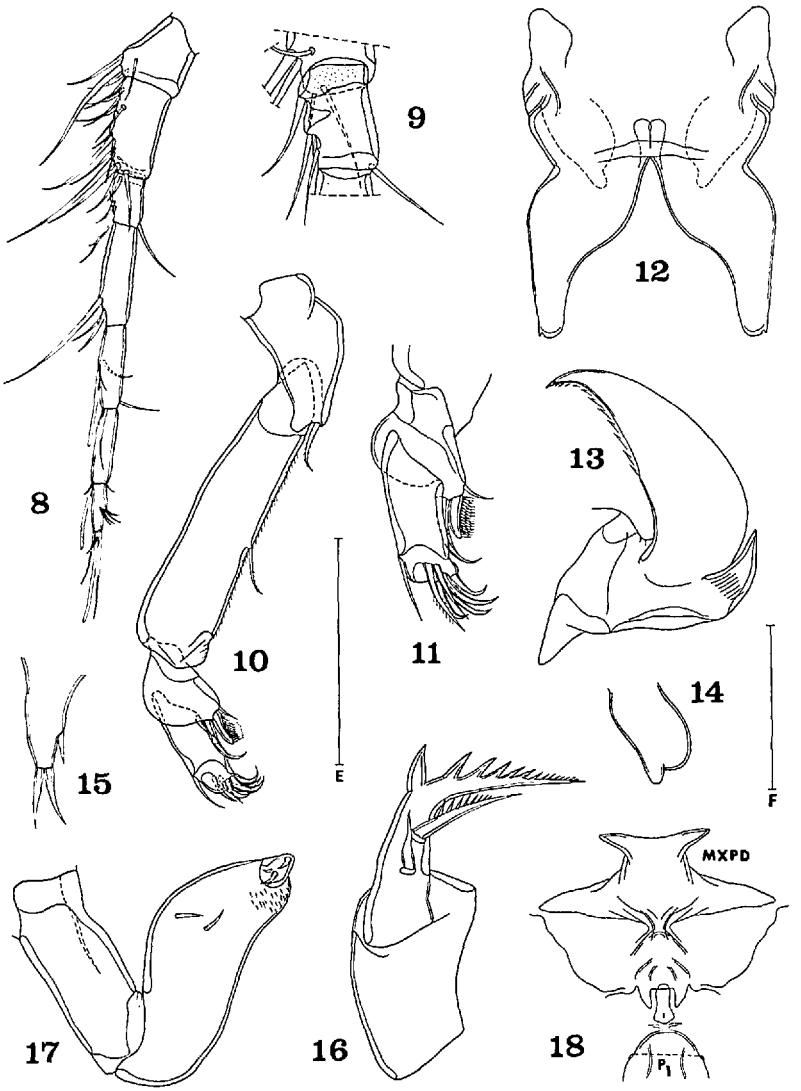
The segment of leg 5 (Fig. 25) is 122μ × 180μ. The genital segment is 224μ × 187μ. The four postgenital segments are 153μ × 130μ, 138μ × 107μ, 109μ × 83μ, and 96μ × 66μ, from anterior to posterior.

The caudal ramus resembles that of the female, but is smaller, 122μ × 26μ.

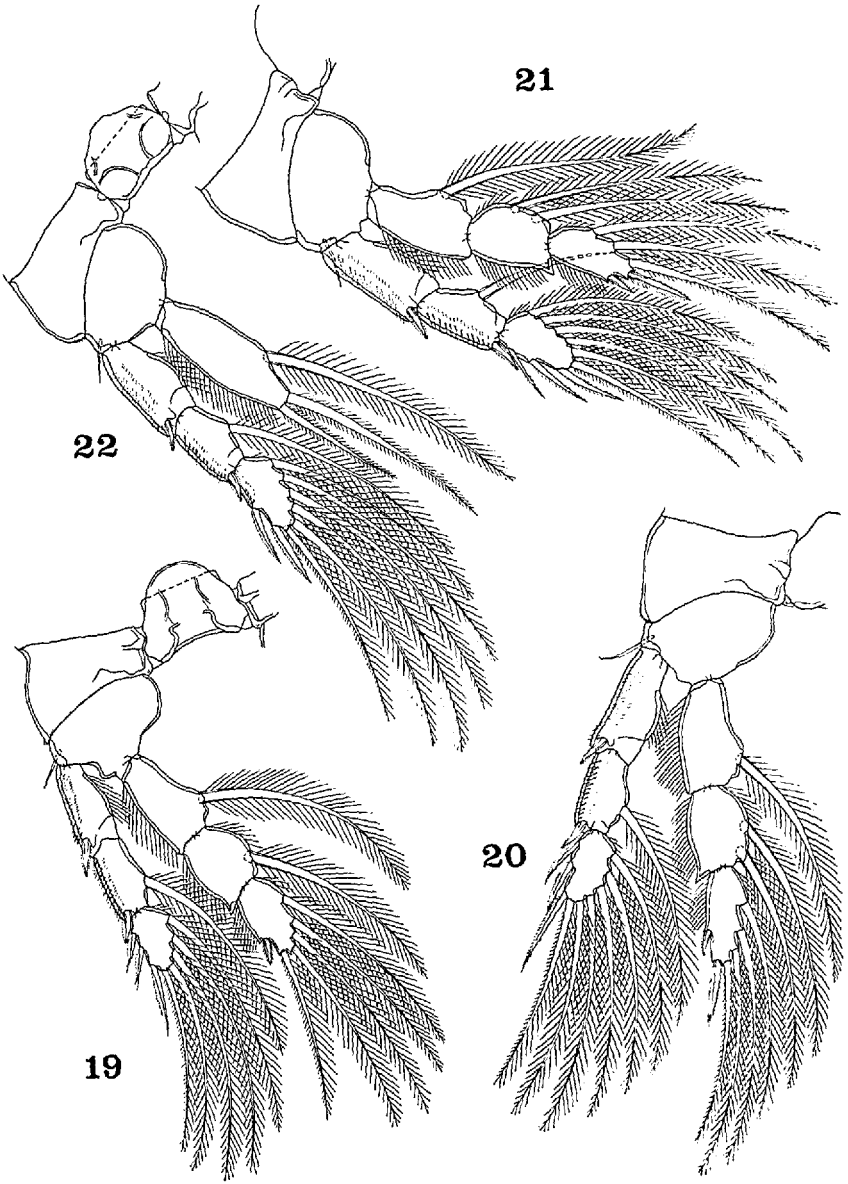
The rostrum, first antenna, second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla are like those of the female. The maxilliped (Fig. 26) is 4-segmented, assuming that the proximal part of the claw represents a fourth segment. The first segment is unornamented. The elongated slender second segment bears two inner setae, one of them finely barbed, the other naked, and three rows of spinules. The small third segment is unarmed. The claw, weakly divided about midway, is 213μ along its axis (including the terminal lamella), and bears two very unequal proximal setae, the larger one with short barbs, the smaller one naked.

The ventral area between the maxillipeds and the first pair of legs is similar to that in the female.

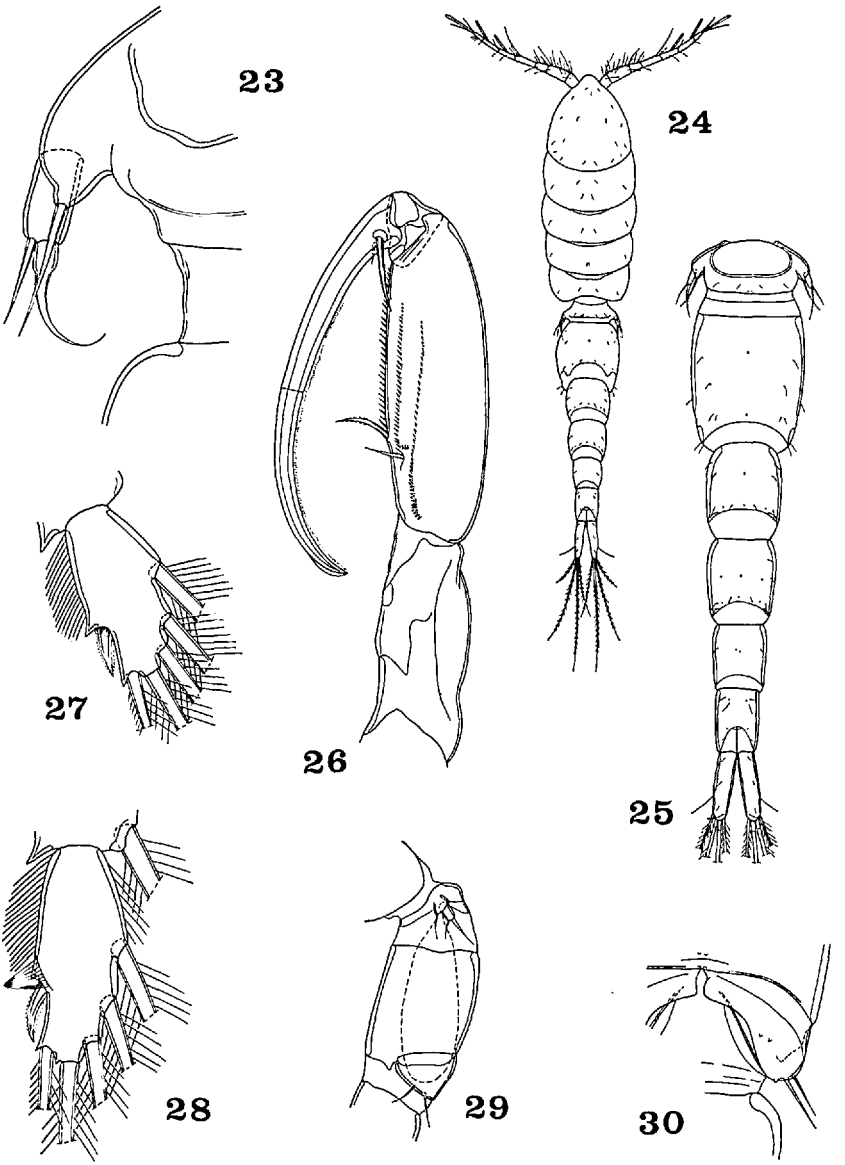
Legs 1-4 resemble those of the female except for minor differences. On the third endopod segment of leg 1, the spinules near the insertion of the spine are longer (Fig. 27). On the same segment of leg 2 (Fig. 28) and leg 3 these spinules are replaced by a row of long, closely appressed hairs forming a fringe.



FIGURES 8-18. *Octopicola regalis*, n. sp., female: 8, first antenna, dorsal (scale C); 9, third segment of first antenna, ventral (E); 10, second antenna, antero-inner (D); 11, third and fourth segments of second antenna, postero-outer (E); 12, labrum, with position of paragnaths indicated by broken lines, ventral (F); 13, mandible, anteroventral (F); 14, paragnath, ventral (F); 15, first maxilla, ventral (F); 16, second maxilla, postero-inner (F); 17, maxilliped, medial (E); 18, area between maxillipeds and first pair of legs, ventral (C). (Scale E = 0.1 mm; F = 0.05 mm.)



FIGURES 19-22. *Octopicola regalis*, n. sp., female: 19, leg 1 and intercoxal plate, anterior (scale C); 20, leg 2, anterior (C); 21, leg 3, anterior (C); 22, leg 4 and intercoxal plate, anterior (C).



FIGURES 23-30. *Octopicola regalis*, n. sp.—23, female: leg 5, dorsal (scale E).—24-30, male: 24, dorsal (A); 25, urosome, dorsal (B); 26, maxilliped, inner (D); 27, third segment of endopod of leg 1, anterior (F); 28, third segment of endopod of leg 2, anterior (F); 29, legs 5 and 6 *in situ*, lateral (B); 30, leg 6, ventral (C).

Leg 5 (Fig. 29) resembles that of the female, though the free segment is smaller, $31\mu \times 13\mu$.

Leg 6 (Figs. 29, 30) is a posteroventral flap on the genital segment bearing two naked setae 36μ and 50μ plus a small knob.

The spermatophore was not seen.

Living specimens were colored as in the female.

Etymology.—The specific name *regalis*, Latin = regal, alludes to the large size and imposing appearance of this cephalopod associate.

Comparison with Other Species.—Two species of the genus *Octopicola* Humes, 1957, have already been described. *O. superbus* Humes, 1957, comprises two subspecies, *O. s. superbus* on *Octopus vulgaris* in northern and southern France, and *O. s. antillensis* Stock, Humes, & Gooding, 1963, on *O. vulgaris* in Barbados, Curaçao, and Florida, and on *O. briareus* Robson in Florida (the latter host cited by Humes & Stock, 1973). *O. stocki* Humes, 1963, lives on *O. cyaneus* Gray (not *O. cornutus* Owen, as originally reported; see Humes & Stock, 1973) in Madagascar.

The female of *O. regalis* may be distinguished from those of *O. superbus* and *O. stocki* by its subpyriform genital segment, widest anteriorly in dorsal view. In addition, it is larger (length 2.24 mm) than those of either *O. superbus* (1.83 mm) or *O. stocki* (1.72 mm), and its caudal ramus (ratio of length to width, 4.7 : 1) is relatively shorter than in *O. superbus* (about 9 : 1) or *O. stocki* (7.6 : 1). The male of *O. regalis* is less easily separated from those of the other two species. However, its size (length 1.62 mm) is intermediate between those of *O. superbus* (1.90 mm) and *O. stocki* (1.30 mm), with no overlap. Furthermore, the outermost seta of leg 4 endopod does not show distinct sexual dimorphism as in *O. stocki*. The free segment of leg 5 is about 2.4 : 1 instead of being subquadrate as in *O. superbus*, and leg 6 has two relatively short setae instead of one of these setae being very long as in *O. superbus*.

The armature of legs 1-4 is the same in all three species of *Octopicola* (see the formula above). In Figure 20, which accompanied the original description of *O. stocki*, the formula for the third endopod segment of leg 3 was shown as I,I,4 (Humes, 1963), but this drawing was evidently made from an aberrant specimen. A reexamination of specimens of *O. stocki* shows that the true formula for this segment is I,I,3, as in the other two species of the genus.

Distribution of Octopicola.—*Octopicola* lives in association solely with members of the genus *Octopus*. It is now known from three species, *Octopus vulgaris, O. briareus,* and *O. cyaneus*. Its geographical distribution includes western Europe, the West Indies, Eniwetok Atoll, and New Caledonia. Copepods of this genus are probably ubiquitous associates of

Octopus, occurring as far as known on the body surface, in the mantle cavity, and on the eggs of the cephalopod.

SUMARIO

Octopicola regalis, N. SP. (COPEPODA, CYCLOPOIDA, LICHOMOLGIDAE) ASOCIADO CON *Octopus cyaneus* DE NUEVA CALEDONIA Y DEL ATOLÓN ENIWETOK

Se describe un nuevo copépodo ciclopoideo, *Octopicola regalis*, n. sp., asociado con *Octopus cyaneus* de Nueva Caledonia y del atolón Eniwetok. Este constituye el primer reporte del género en el Océano Pacífico.

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